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MERADO-Ludhiana Releases its Know-how for Turret Lathe, Reaming Machine & Fuel-efficient Gas Stove

Function held on 5 August 1981 at Mechanical Engineering Research Development Organisation (MERADO), Ludhiana, Prof. S. Nurul Hasan, CSIR Vice President, released know-how of three MERADO-developed products, viz. (i) single-spindle automatic turret lathe, (ii) multi-spindle automatic reaming machine, and (iii) fuel-efficient LPG stove to the industries which had sponsored developmental work on them. The opportunity was also availed by this MERADO centre to

demonstrate the working of the tractor-driven combine harvester, which it has developed under industry sponsorship and would be releasing after field trials.

Driving home the point that India's development strategy was based on self-reliance, the chief guest Prof. Nurul Hasan said in his address that in removing poverty and improving the living standard of the common man the creation of new trades, new industries, and new techniques was of paramount importance. We should produce goods not merely for our own use but for

export to other countries, he added. In this context he made it clear that there was no conflict between big industry and small industry: without the help of small-scale ancillary industry large-scale industry cannot progress, and vice versa. The two are interdependent and both are relevant as far as development is concerned, the CSIR Vice President emphasized. Prof. Nurul Hasan went on to say that to remove poverty it was necessary to create an environment in which more than half the population was not dependent on agriculture only: one-half of the population could depend on agriculture and the other half on industry. The chief guest underscored the role of science and technology in attaining such a goal.

In concluding his address, Prof. Hasan complimented MERADO scientists and engineers on developing the machines which were being released to industry, and also the industrialists for sponsoring projects which had resulted in the development of the machinery.

Presiding over the function, Dr G.S. Sidhu, Director General, Scientific & Industrial Research, stated that the country had reached such a level of competence in research, design and engineering and also manufacturing capacity that it should look forward to



Prof. S. Nurul Hasan, CSIR Vice President, releasing technical know-how of multi-spindle automatic reaming machine developed by MERADO-Ludhiana to Shri S.K. Malhotra of Friends Auto Industries, Phillaur. Dr G.S. Sidhu (*sitting*) Director General, Scientific & Industrial Research, presided. Also seen in the photograph are Shri Hardyal Singh (*extreme left*), Scientist in charge of MERADO-Ludhiana, and Dr S.K. Basu (*extreme right*), Director, CMERI, Durgapur

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exporting machinery and equipment in large numbers to a large number of countries. To be able to achieve this goal we should be competitive not only in price but in quality as well, said the Director General in a hortatory message to the engineering R&D organizations. He made special mention of the Central Mechanical Engineering Research Institute's Swaraj tractor, which, licensed to industry by the National Research Development Corporation of India, had netted in royalties, at the rate of 2½% of sales, amounting to some Rs 30 million.

Referring to the phenomenal successes achieved by advanced countries like Germany and Japan in engineering industries, the Director General stated that for every shop floor engineer there were four R&D engineers behind the industrial scene in those countries. Exhorting enlightened industrialists to try this experiment, whose benefits are so obvious, Dr Sidhu said that if they could not set up their own R&D units, they could at least deploy, for every production engineer they employ in their establishment, four R&D engineers in MERADO. Dr Sidhu also mentioned many areas of successes achieved in R&D work in the country, which had not received publicity worthy of such achievements, as, for example, the Rs 130 million low-temperature carbonization plant set up in Andhra Pradesh entirely with indigenous know-how and equipment.

In his address, Dr S.K. Basu, CMERI's Director, said that MERADO's objective at the time of inception was to help industries maintain quality control, but over the years these organizations had developed sufficient expertise in design and development of a wide range and variety of machinery and equipment. Ludhiana's MERADO for instance, he said, had developed hosiery and knitting machines, agricultural implements, and even special-purpose machines, which are not tackled by institutes like the Central Machine Tools Institute. These centres also organized from time to time

special courses for the benefit of engineering industry. Dr Basu also referred to the excellent rapport established between MERADO-Ludhiana and industry as a consequence of which industry had successfully absorbed the technologies for the production of a large number of machinery—the woollen knitting machine, to mention just one.

Shri Hardyal Singh, Scientist in charge of MERADO-Ludhiana, gave an account of his centre's work, ever since it came into being in 1965, towards modernization and growth of small-scale as well as medium-scale industries in the region.

Given below are brief descriptions of products whose know-how was released to industry.

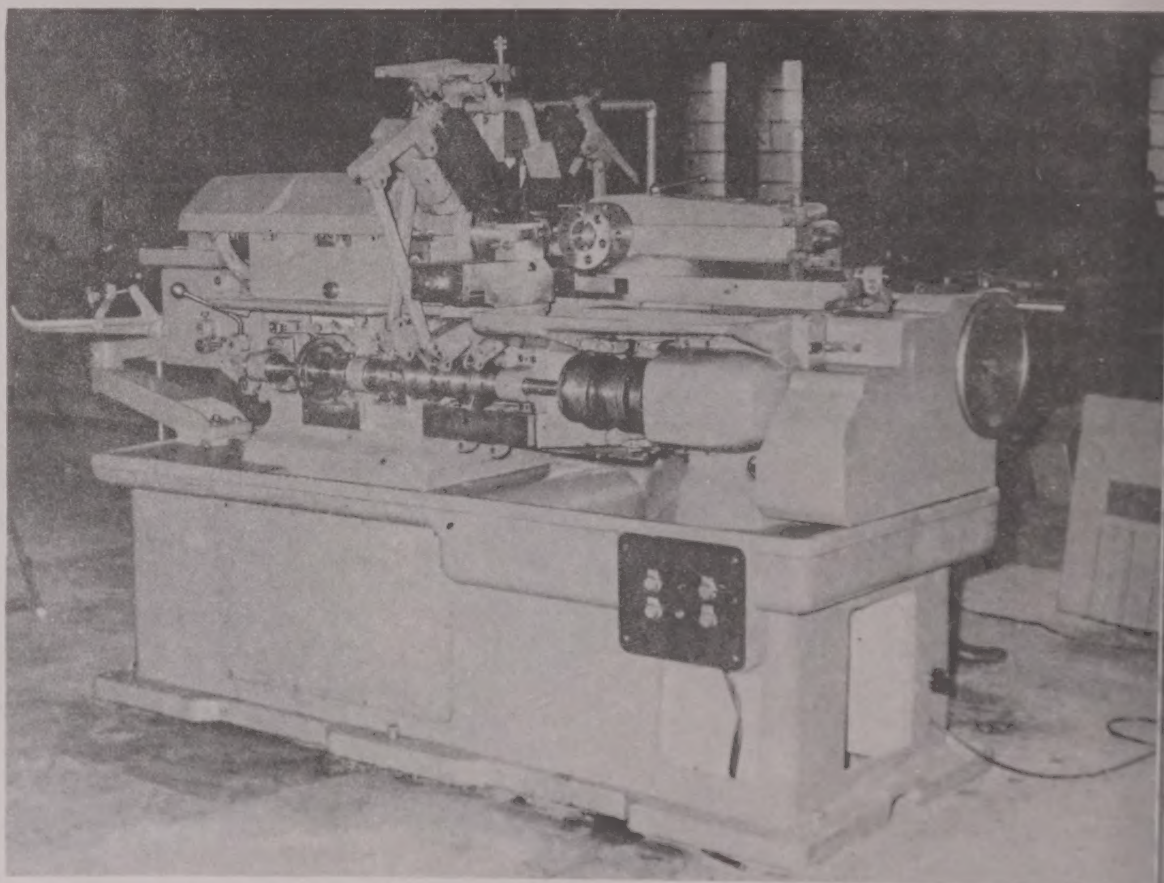
Single-Spindle Automatic Lathe

This MERADO-designed lathe (42 mm capacity), the first indigenously designed lathe, has provision for six- or eight-station turret. Has five transverse slides, including a compound slide at the rear and a separate swing-type bar stop. Can be equipped with 11 different tools out of which six can operate simultaneously to perform any of the desired

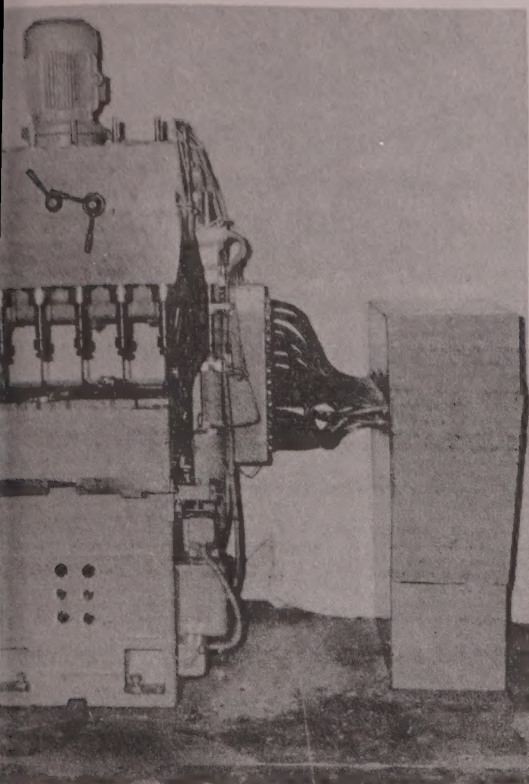
combination of operations: turning, drilling, boring, reaming, tapping, threading, facing, parting, or grooving. Provisions exist for adjusting angular position of the cams in steps of 2° and the 'cam-rise to tool travel' ratio in a stepless manner, which enable the machine to perform machine tool operation on a variety of turned work with one set of cams. An auxiliary camshaft is provided with six revolution clutches which accelerate motion, viz. opening/closing, tool indexing, etc. This increases the overall production of the machine.

The lathe provides four spindle speeds in one cycle with a choice from 10 forward speeds and 190 reverse speeds and a wide range of feeds for various applications. The rationalized distribution of operations, and the convenience with which these can be selected, make the machine a versatile and efficient production tool.

The know-how of the lathe has been taken over by Accurate Engineering Works, Ludhiana, who would be marketing it at half the cost of commercially available models based on imported know-how.



Single-spindle automatic turret lathe



Multispindle reaming machine

Multispindle Reaming Machine

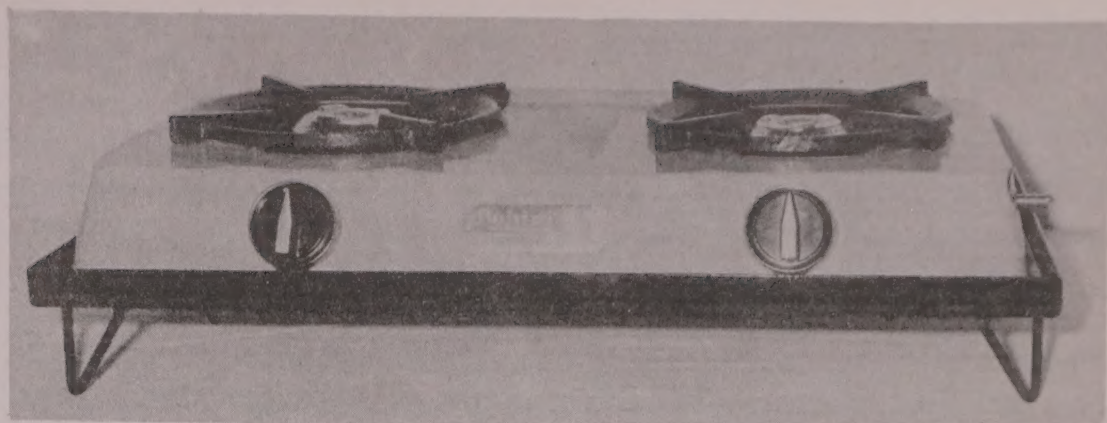
This is a special-purpose machine designed and developed by MERADO-Ludhiana for automatic reaming of valve guides of internal combustion engine to the desired surface finish of $0.05 \mu\text{m}$. Has five spindles in a line and automatic loading and unloading stations; ability to perform in a designed sequence such operations as clamping, declamping of components to be reamed; indexing of fixture-mounted components; and engaging/disengaging of reamer and its fast retraction. Pneumatic controls are used for automation of operations. The reaming capacity of the machine is 6000-8000 valve guides per 8 hr shift. The prototype has given satisfactory performance.

The developmental work on this reaming machine was sponsored by Hindustan Auto Industries, Phillaur, with a view to improving the quality of IC engine valve guides manufactured by them.

Other manufacturers of IC engine valve guides have shown interest in the machine, and the design of the machine is likely to be released to such parties.

Fuel-efficient LPG Domestic Stove

This MERADO-designed stove, which gives a completely blue and stable



Fuel-efficient LPG stove

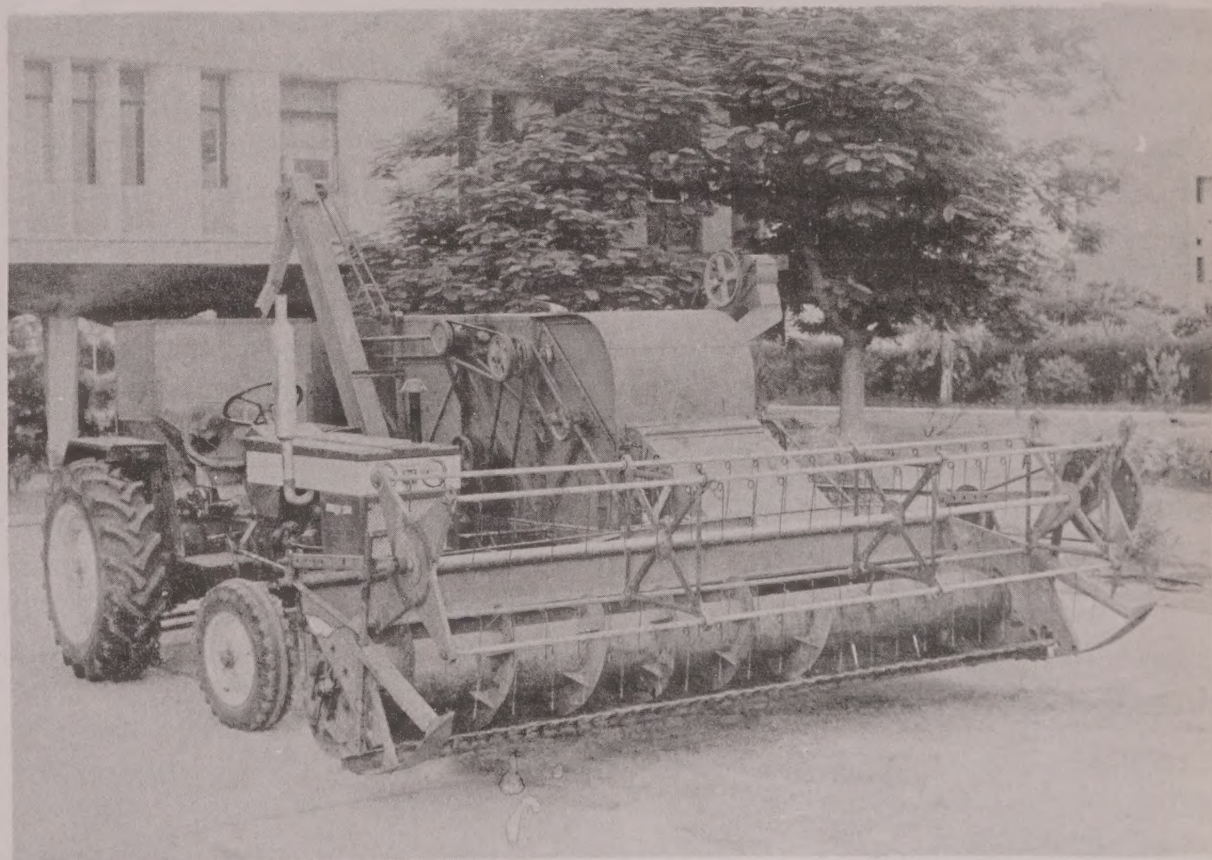
flame, is an improved gas stove and, as the name indicates, possesses a higher thermal efficiency than models available in the market, i.e. it consumes a lesser amount of gas for the same heat output. Its burner rating has been optimized, which further helps save gas. Other salient features of the stove:

1. Its burner is considerably lighter in weight compared to the burners available in the market at present.
2. Bigger port size (36 No. drill) and a fewer number of burner ports (53 for big and 39 for small) minimize the chances of clogging and facilitate easy cleaning of ports.
3. The chassis is both functional and aesthetic.
4. Furthermore, the chassis is painted in pleasing shades with an

electrostatic spray painting system, which ensures uniform paint thickness and better edge coverage and hence longer life for painted surfaces.

The technical know-how for the stove has been transferred to Selection Appliances Pvt Ltd, Ludhiana, who have set up a plant for the production of 60,000 stoves per annum. MERADO has also rendered technical services to this firm in preparing a detailed project report, in machinery selection, plant layout, design of tooling, of jigs and fixtures, and two special-purpose automatic machines required for the production of the stove.

The present production capacity of LPG stoves in India is about 40,000 per month, and the government is planning to release shortly domestic gas



Prototype of tractor-driven combine harvester

connections to new consumers at the rate of one lakh units per month. Hence exists a vast potential market for LPG stoves.

The MERADO-designed stove will be marketed under the commercial name Rohini.

Combine Harvester

This tractor-driven combine harvester, which MERADO has designed and developed for a private industry (Jindal Combines Pvt. Ltd, Sangrur), is more suitable to Indian conditions, especially because self-propelled combines are expensive and therefore beyond the reach of average farmers.

To be used with 35 hp tractors, the harvester can harvest crops like wheat, paddy, barley and soya bean. Is expected to have a field capacity of around 0.44 ha/hr (taking 2 kmph forward speed and 70% field efficiency).

Manual harvesting of headland is not required for the entry of this combine in the field as it has a cutter bar of 3.2 m which covers the pulling tractor.

The grain tank frame is hinged on to the chassis of the machine to enable easy assembly of the tractor. The machine has been provided with two steering wheels in the front and one wheel at the rear for even distribution of load, which does not affect the stability of the tractor by side pulls.

The harvester is driven by power take-off of tractor and is also steered by tractor steering. The header can be raised or lowered through a hydraulic cylinder the controls of which are within the reach of the operator sitting on tractor seat.

The know-how for the combine harvester will be released to industry following field trials. □

USDA appreciates RRL-Hyderabad scientists' research on unusual fatty acids

For their work on glyceride structure and biosynthesis of certain seed lipids containing petroselinic and conjugated trienoic acids, Dr G. Lakshminarayana

(principal investigator) and his associates Dr T.N.B. Kaimal, Dr V.V.S. Mani, Shri K.V.S.A. Rao, Smt K. Sita Devi and Shri T. Chandrasekhara Rao, of the Regional Research Laboratory, Hyderabad, have been awarded a certificate of appreciation by the United States Department of Agriculture. The study was aimed at obtaining basic information for use in developing new agricultural sources of these acids which have potential or demonstrated industrial importance. Conjugated trienoic fatty acids are used in surface coatings. Petroselinic acid on cleavage yields lauric acid, a valued component of surface-active agents, and adipic acid, used in nylons and other industrial products.

Changes in fatty acids were studied during maturation of *Memordica charantia* and *Trichosanthes anguina* seeds, which contain octadeca-*cis*-9, *trans*-11, *trans*-13-trienoic acid (α -eleostearic) and octadeca-*cis*-9, *trans*-11, *cis*-13-trienoic acid (punicic), respectively. The two seeds matured in 30 and 35 days after flowering, respectively. Total lipids as well as α -eleostearic acid accumulated rapidly from 10 to 20 days in *M. charantia* seeds. In *T. anguina* seeds the active period of total lipid synthesis was from 15 to 30 days but punicic acid synthesis continued until full maturity. In both the species, the disappearance of linolenic acid and reduction in concentration of linoleic acid were concomitant with the formation of conjugated fatty acids. The conjugated fatty acids were absent from monoacylglycerols and phospholipids of both the species and also from the diacylglycerols of *M. charantia*, throughout maturation.

The seeds of *Diplocyclos palmatus* Linn. (Cucurbitaceae) contained 23% oil and 15% protein. Spectral, chromatographic and chemical analyses showed the presence of punicic acid. The oil had the fatty acid composition (wt %): punicic, 38.2; linoleic, 43.9; palmitic, 8.1; stearic, 4.9; and oleic, 4.9.

Changes in fatty acids were studied during maturation of *Coriandrum*

sativum seeds. The seeds matured 15 days after flowering. Lipid synthesis proceeded at a steady rate up to 40 days after flowering. Reductive ozonolysis of the monoenes followed by gas-liquid chromatographic analysis of the hydrolytic fragments as dioxolanes of propanediol was employed to estimate petroselenate (octadeca-*cis*-6-enoate) in the presence of oleate (octadeca-*cis*-9-enoate). Petroselenic acid was the major fatty acid at all stages.

Catalytic Properties of Zeolites

Zeolites—crystalline aluminosilicates with uniform pore structure—provide a convenient framework for a study of coordination chemistry of transition metal ions in well-defined surface environments. Moreover, transition metal exchanged zeolites can be used as heterogeneous catalysts for a variety of reactions. Shri S.J. Kulkarni of Physical Chemistry Division of National Chemical Laboratory (NCL), Pune, has studied the preparative characterization and catalytic reactions of ferric exchanged zeolites.

The ferric exchanged Y zeolite catalysts were prepared, and characterized by X-ray diffraction, infrared spectra, thermal analysis, visible spectroscopy, electrical conductivity and photoelectron spectroscopy. On the basis of thermal analysis and visible spectra, the presence of $[\text{Fe}(\text{OH})(\text{H}_2\text{O})_5]^{2+}$ complex was proposed. Thermal analysis confirmed the prediction of migration of ferric ions into sodalite cages above 400°C. The migration of ferric ions was irreversible. Electrical conductivity measurements indicated that mainly sodium ions in supercages contribute to the ionic conductivity. The XPS results were recorded with respect to ion-exchange activation process, and coke formation.

The adsorption isotherms of butylamine and water were studied. The number and distribution of acid centres in supercages with respect to percent ferric exchange were also evaluated. The chemical potential values

heats of adsorption were determined and affinity sequence was established at different coverages.

The ferric exchanged Y zeolite catalyst was tested for the dehydrogenation of ethylbenzene to styrene. Dealkylation and dehydrogenation reactions occurred simultaneously on the catalyst. The product distribution was found to change with the decrease in coke centres which was due to the coke oxidation. The conversion to styrene decreased with decrease in dealkylation products and remained steady after 3 hr on stream under optimized conditions.

Shri Kulkarni, who worked under the guidance of Dr (Kum) S.B. Kulkarni of NCL, was awarded Ph.D. degree by the Poona University for his thesis based on these studies. □

Dyes from Naphthalene Derivatives

The formation of naphthazarin (5,8-dihydroxy-1,4-naphthoquinone) predicted by the interaction of 1,5-dihydroxynaphthalene with sulphur sesquioxide has been investigated by Shri Shri Moghe of the Process Development Division of the National Chemical Laboratory (NCL), Pune.

Earlier, Fieser had suggested the formation of 1,5-dihydroxyaminonaphthalene as the intermediate product but it had not been isolated and characterized. In the present work, a number of intermediate products, such as naphthodisultam, 1,8,4,5-naphthothiazolodisulfoxide and 8-amino-5-hydroxy-1,4-naphthoquinone were isolated and characterized by elemental analysis and spectral studies. A plausible reaction mechanism for the formation of naphthazarin has been suggested. The intermediate naphthodisultam was eliminated to give a mixture of di- and mono derivatives of 8-amino-5-hydroxy-1,4-naphthoquinone. This mixture had dyeing properties similar to those of the commercial dye C.I. Disperse Blue 20.

1-Morpholinonaphthalene and 1,8-dimorpholinonaphthalene, derived

from 1-naphthylamine and 1,8-dinaphthylamine, were used as coupling components for the synthesis of a wide range of new yellow to violet azo disperse dyes.

Substituted 3-hydroxy-1,2,3,4-tetrahydrobenzo[h]quinoline and their derivatives were used as coupling components for the synthesis of new azo blue disperse dyes. These gave dyeings on polyester and exhibited good fastness properties.

The important intermediate naphthostyryl was prepared from 1-naphthyl isocyanate and 1-naphthyl isothiocyanate, and was used for the synthesis of a series of blue cationic dyes by condensation with N-phenylmorpholine, N-(1-naphthylmorpholine) and 1,2,3,4-tetrahydro-3-chlorobenzo[h]quinoline. These dyes gave fast blue shades on polyacrylonitrile fibres.

Naphtho-1,8-lactone was prepared by the action of sodium nitrite on naphthostyryl. The former reacted with alcohols such as ethyl alcohol and methyl alcohol in the presence of zinc chloride to give 2-hydroxy-2-ethoxy-2H-naphtho[1,8-bc]furan, and 2-hydroxy-2-methoxy-2H-naphtho[1,8-bc]furan. Its reaction with dimethylaniline yielded 4,4'-(2H-naphtho[1,8-bc]furan-2-ylidene)-bis-N, N-dimethylbenzeneamine, which has been shown to be a pressure-sensitive dye.

Shri Moghe, who carried out the studies under the guidance of Prof. B.D. Tilak (ex-Director of NCL), was awarded Ph.D. degree by the Poona University. □

PROGRESS REPORTS

NIO Annual Report: 1980

The annual report of the National Institute of Oceanography (NIO), Dona Paula, Goa, for the year 1980, just published, shows that over a period of 15 years, since the laboratory was established, it has built up infrastructure and acquired capability to explore as well as exploit the vast, as yet inadequately tapped, resources of the seas around India.

NIO's research vessel *Gaveshani* completed 19 cruises, covering 35,000 line km, in the Arabian Sea and Bay of Bengal and collected data on physical, chemical, geological, and geophysical aspects, and on living and nonliving resources as well as on environmental conditions from 645 stations. Surveys of pipeline routes from Bassein to Bombay High and Direction Bank and in the estuarine regions of the rivers Hooghly and Mahanadi were also carried out for fixing the position of the drilling rig 'Chancellors Ville' of Oil India Ltd.

Analysis of the chemical data collected during the cruises revealed some interesting features on the relative fertility of the Andaman Sea. Oceanographic data collected from the Andaman Sea have shown that an annual evaporation rate of 137 cm over the region and the vertical heat transport were confined to 20 m of water where a strong halocline prevented the heat transfer to greater depths. These findings have an important bearing on the moisture transfer and atmospheric circulation in the area. Hydrochemical data off the west coast indicated the presence of two oxygen minima associated with two phosphate maxima at depths of about 300 m and 1000 m. Pollution surveys along the oil tanker routes in the Arabian Sea and in the southern Bay of Bengal from the south of Sri Lanka to the head of the Malacca strait showed an abundance of oil slicks amounting to nearly 3700 tonnes and 1100 tonnes of floating tar balls in the Arabian Sea and Bay of Bengal respectively; petroleum hydrocarbons content in the upper 20 m of the two seas is estimated at several million tonnes.

The results of the MONEX-79 programme indicated significant variations in the upper 500 m during the period May to June 1979. In spite of the increase in sea temperature by about 1°C and decrease in the thickness of the mixed layer by about 10 m, the cyclone heat potential showed an increase from May to June. Transformation of the thermodynamic energy suggests that the energy due to contraction of mixing is

important in understanding the water-mass structure.

The infrastructure for studies in physical oceanography was augmented by launching an oceanographic and meteorological data buoy, moored from R.V. *Gaveshani* off Goa in the Arabian Sea. All the probes installed on the buoy worked satisfactorily.

Screening of marine organisms for medicinal properties was continued. Antiviral activity observed in *Codium elongatum* was found located in the water-soluble fraction, and localized in the polysaccharide fraction.

A new multidisciplinary project to survey the environmental features in the estuarine region of seven major Indian rivers was taken up during the year.

Geological and geophysical surveys of the entire continental shelf were completed to assess the petroleum and mineral wealth. In Ratnagiri, Mirya and Kalbadevi bays, the reserves of ilmenite up to a depth of 1 m were inferred to be 2 million tonnes. With the thickness of sand indicated by seismic records to be 21 m and with their probable extension up to depths of 15 to 17 m, the total reserves in the other 13 bays may be many times greater than those of the Ratnagiri Bay.

Survey of the biological resources in the seas around India is an important area of work under the biological oceanography programme. Modified techniques are being employed for culturing shell fish, shrimp and *Artemia*. The institute has located new sources of *Artemia*, for which there is great demand as food in aquaculture experiments, and has cultured it on a mass scale in the salt pans of Gujarat.

In a project concerning energy resources from the sea, an ocean thermal energy plant of 200 W capacity has been designed.

In the design and fabrication of oceanic instruments, the institute achieved a certain measure of self-reliance with the development of such sea probes as conductivity-temperature-depth (CTD) recorder, buoy telemetry

system, and a shallow-water echosounder.

The institute also undertook as many as 26 sponsored projects relating to the development of offshore oilfields, pollution control, coastal development, and resources surveys. □

National Index of Translations

A yearly index of titles of S&T literature translated into English from other foreign languages (numbering about 30) by various specialized agencies in India is being compiled by the Indian National Scientific Documentation Centre (INSDOC), New Delhi, under the title 'National Index of Translations' (NIT). A UDC-classified list of English translations, NIT gives under each entry, all or some of, the following particulars: author(s), title, language, pages, citation, translating agency, and serial number of translation. Five parts relating to the year 1981 have been issued to date; together they cover 1119 documents, which include research papers, monographs, books, patents, standards, etc.

Copies of NIT (unpriced) are available to institutions. Copies of the translations listed will be made available, on payment, by INSDOC or the concerned translating agency. Enquiries to be addressed to Scientist in charge, or Coordinator (Translation Division), INSDOC, Hillside Road, New Delhi 110012. □

Science Information Services in India: 1980

This is the title of a directory of S&T documentation and related services available in scientific research institutions in India. Compiled by the Indian National Scientific Documentation Centre (INSDOC), New Delhi, the directory covers 465 organizations spread over apex science agencies and departments; institutions under the Central Government and under state governments; private research institutions; universities; industries' R&D centres; etc. The

information on various types of services offered by the institutions was collected through questionnaires, and the data were computer-processed. The directory includes place index, services index, classified institutions index, and word index—all, again, computer prepared.

Priced at Rs 100 (\$ 60), the publication (906 pages) is available from Scientist in charge, INSDOC, Hillside Road, New Delhi 110012.

EXTRAMURAL RESEARCH

Composition of Herbaceous Seed Oils

Smt Sarita Sinha, a CSIR research fellow, has studied the composition of the seed oils from *Malva parviflora* (Malvaceae), *Abelmoschus ficulneus* (Hibiscus *ficulneus*), and *Leucas phalotes* (Labiatae), as also the hydrochlorination of ricinoleic acid. These studies were made at the Department of Chemistry (Oils & Fats Section), Aligarh Muslim University, Aligarh.

Seed oil of *M. parviflora* was found to contain *cis*-12, 13-epoxy-*cis*-octadecenoic, 13-hydroxy-9,11-octadecadienoic, and malvalic acids in addition to the conventional fatty acids. The presence of cyclopropenoid acid was established by positive Halphen test and HBr titration. The structures of the conjugated dienol acid 13-hydroxy-9,11-octadecadienoic acid and vernolic acid were established by chemical and spectral methods.

A. ficulneus seed oil was found to contain three HBr-reacting acids: sterculic, malvalic and vernolic acids. The structures were established by chemical methods and using reference standards of *Sterculia foetida* and *Vernonia* oils for GLC quantitations.

Seed oil of *L. cephalotes* has been found to be a rich source of an allenic acid, characterized as octadeca-5,9-dienoic. *L. cephalotes* is the first species of Labiatae known so far to contain the largest amount of laballenic acid (28%). The structure of allenic acid was

ished by chemical and spectral
ods.

Halogenation of Icibic Acid

ypochlorination of ricinoleic acid
ed three products characterized as
yl 9-chloro-10, 12-dihydroxy-
ecanoate (50%), and two minor
onents, methyl 9,10-dichloro-12-
oxyoctadecanoate (3%) and methyl
chloro-9, 12-dihydroxyoctade-
ate (6%). The structures of the
idual reaction products were
lished by spectral and chemical
yses.

ypobromination of ricinoleic acid
ed five products, viz. methyl 9-
no-10, 12-dihydroxyoctadecanoate
, methyl 10-methoxy-9, 12-epoxy-
decanoate (25%), methyl 9-bromo-
hydroxyoctadec-9-enoate (4%), me-
10-bromo-12-hydroxyoctadec-
oate (4%), and 8,11-epoxyhepta-
1,9-dibromide (3%). The formation
cyclic ether has been explained by a
anism involving neighbouring
p participation of hydroxyl
tion.

ypiodination of ricinoleic acid
r gave methyl 9-iodo-10,12-
droxyoctadecanoate (35%) and
hyl 10-iodo-9,12-epoxyocta-
noate (35%). The structures were
ublished by chemical and spectral
ods. □

Chemistry of Sulphur- Fluorine Compounds

Working at the Department of Physical
Inorganic Chemistry of the Indian
Institute of Science, Bangalore, Shri
Bhat, a CSIR research fellow, has
pared and characterized three
fluorides of sulphur, viz. sulphuryl
rofluoride, sulphuryl fluoride, and
nyl fluoride. Lead fluoride, pot-
um fluoride and potassium bif-
ide suspended in acetonitrile were
nd to be convenient fluorinating
nts in the preparation of the
fluorides of sulphur. The oxy-
rides were found to undergo
uction with lithium aluminium

hydride and sodium borohydride.
Thionyl fluoride underwent oxidation
with chloramine-T. Sulphuryl chloro-
fluoride was reduced by anhydrous
hydrogen iodide, but not sulphuryl
fluoride. Both sulphuryl chlorofluoride
and sulphuryl fluoride formed com-
pounds with primary and secondary
amines and adducts with tertiary
amines. The resulting compounds were
isolated and characterized by IR and
NMR spectra and chemical analysis.

Metals and metal oxides were found
to react with sulphuryl chlorofluoride
and thionyl fluoride at elevated
temperatures (above 150°C).

An electrolytic cell for generating
elemental fluorine was designed and
fabricated. A nickel rod was used as the
anode in the electrolytic cell. A mixture
of potassium bifluoride (KHF_2) and
hydrogen fluoride (molar ratio 1:1) was
found to be a suitable electrolyte
(maintained at 80°C). Two to three litres
per hour of elemental fluorine was
found to be generated in this cell.
Tetrasulphur tetranitride was fluorin-
ated using elemental fluorine and the
resulting products were characterized.

A new method was evolved for the
preparation of tetrasulphur tetranitride
by making use of the reaction between
sulphur monobromide (elemental sul-
phur and bromine could also be used)
and ammonia.

A new method was standardized for
estimating elemental sulphur and
sulphur present in a variety of sulphur
compounds by making use of a
reduction mixture containing hydriodic
acid, hypophosphorous acid and hy-
drochloric acid.

Shri Bhat, who worked under the
guidance of Prof. A.R. Vasudeva
Murthy and Dr (Smt.) D.K. Padma, was
awarded Ph.D. degree in 1980 by the
Indian Institute of Science for his thesis
based on these studies. □

Deputation Briefs

Dr L.K. Doraiswamy, Director,
National Chemical Laboratory (NCL),
Pune, who is also Visiting Professor at
the Salford University, Salford, USA,

was at this university from 31 May to
15 June 1981. As a recognized research
guide of the university, he reviewed the
progress of doctoral work being done by
NCL researchers Shri Shankar Ghosh
and Shri P.V. Rao at the Chemical
Engineering Department. He also gave
a seminar on gas-solid interactions.

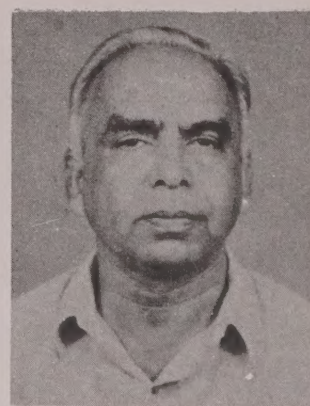
Dr Doraiswamy also visited the
chemical engineering departments of the
Imperial College of Science and
Technology, and University of
Bradford. □

PERSONNEL NEWS

Appointments/Promotions

Dr N.G. Ghatge

Dr N.D. Ghatge, Scientist EII and head
of the Polymer Chemistry Division of
the National Chemical Laboratory
(NCL), Pune, has been promoted as
Scientist F (21 July 1981). Working at
NCL for the past 23 years, Dr Ghatge
has developed many processes for
plastics and rubber industries, which are
under industrial utilization. He has been
consultant to many rubber/plastics
factories around Pune, and represents



NCL on many government research
institutions. Dr Ghatge was awarded a
gold medal in 1972 by Indian Rubber
Industries Association and the pre-
stigious, first Dunlop Award in 1978 by
the Indian Rubber Manufacturers
Research Association for his outstand-
ing research in rubber technology. □

Retirements

Shri N.A. Bhat

Shri N.A. Bhat, Scientist EI, of the
National Chemical Laboratory (NCL),
Pune, retired on 30 June 1981.

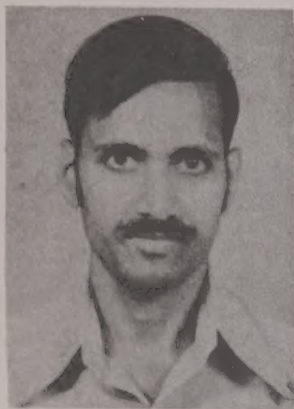
Shri Bhat, who joined NCL in 1958 as
Senior Scientific Assistant, rose to the

position of Scientist EI. He had earlier (1954-56) worked at NCL on deputation from Explosives Research & Development Laboratory on a Ministry of Defence project concerning process development for hexachloroethane. At NCL he was associated with a number of process development projects in fine chemicals, besides industry-sponsored projects on ethyleneurea, dimethylolethyleneurea and 1,3-butyleneglycol. He was an M.Sc. from Bombay University. □

Honours and Awards

INSA's Young Scientists' Medal for two CSIR Scientists

B.D. Kulkarni of the Chemical Engineering Division of the National Chemical Laboratory (NCL), Pune, and Dr Umesh Chandra Das of the National Geophysical Research Institute (NGRI), Hyderabad, are among the scientists named by the Indian National Science Academy for receiving its 'Science Academy Medal for Young Scientists' for 1981. The award carries a medal, a cash prize of Rs 5000, and an additional research grant.



Dr Kulkarni



Dr Das

The award to Dr Kulkarni is for his contributions to fluidization and analysis of multiplicities and instabilities in chemically reacting systems. Dr Das gets the award for his work on computer modelling for interpreting electrical and electromagnetic measurements by geophysical methods. Brief descriptions of the work of these two young scientists follow:

Dr Kulkarni

Dr Kulkarni has proposed a strategy for the design and modelling of fluid-

bed reactors for complex reactions. He has also devised means, such as catalyst dilution, to make the reactor operation efficient. He has worked out an optimization strategy to obtain the best results.

With regard to heterogeneous, chemically reacting systems, he has suggested the change in concentration of active centres as the mechanism of feedback to explain a wide variety of phenomena. The change in concentration of active centres on the surface can lead to such phenomena as instability and sudden loss of catalyst activity. Hitherto these findings were experimental and no theoretical explanation was available. More generally, he has provided analysis of several mechanisms in chemical and biochemical systems, explaining the experimentally observed intriguing phenomena under isothermal conditions.

Dr Kulkarni is with NCL since 1979 as Scientist C. Earlier, as a research fellow since 1973, he earned his Ph.D. in 1977.

Dr Das

Since 1977 Dr Das has been engaged in the task of computer modelling for interpreting electrical and electromagnetic measurements over 3-dimensional arbitrarily shaped conductive deposits in the presence of complex geological situations. Although attempted at a few other places in the world, the task was computer cost-prohibitive. Dr Das has formulated the problems, incorporating a digital linear filtering scheme, and developed a computer program which is the fastest of its kind in the world. The program finds extensive use in accurate quantitative interpretation of geophysical measurements for exploring base metals like copper, lead, silver, and gold.

Obtaining his M.Sc. and Ph.D. degrees in geophysics from the Banaras Hindu University (BHU), Varanasi, in 1970 and 1973 respectively, Dr Das was on the BHU's faculty of geophysics prior to joining NGRI, in 1977. He has about 20 publications to his credit. □

OBITUARY

Shri D.N. Krishna Rao, head of N Experiment Station at Bang passed away on 16 July 1981. Born February 1922, Shri Krishna Rao started his career with CSIR as a humble overseer at NCL, Pune, and rose to the position of Scientist at NBRI by sheer dint of hard work and virtue of practical knowledge.

CSIR RESEARCH ASSOCIATESHIP

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